

REMARKS

In the Office Action mailed November 26, 2003, claims 26-39 were rejected under 35 USC §103(a) as being unpatentable over Ting et al. (U.S. 6,187,152), and further in view of Kamikawa et al. (U.S. 6,131,588).

Applicants address concerns of the Examiner. Independent claim 26 is amended to more clearly recite the present invention. New claims 92-97 are added. No additional fees are required.

§103

Claims 26-39 were rejected under §103 as obvious in view of Ting et al. and Kamikawa et al. Under the Graham test, three factors must be evaluated: the scope and content of the prior art; the differences between the prior art and the claimed invention; and the level or ordinary skill in the art. (MPEP 706 and 2141 et seq.).

The Examiner concedes that Ting et al. fail to specifically teach the use of a movable guard or the deposition of the workpiece in the lower section of the chamber and then raising said workpiece to an upper section for cleaning. The Examiner indicates that Kamikawa et al. teach the use of a movable guard between an upper section and a lower section of a chamber, where the workpiece is treated in a lower section and then moved to an upper section.

Claim 26 is rejected because it would have been obvious and within the ordinary skill in the art at the time the invention was made to have modified Ting et al. to use the movable guard as taught by Kamikawa et al. and in addition, treating the substrate in the lower section and then moving it to an upper section to be treated because Kamikawa et al. teach the use of a movable guard between an upper section and a lower section of a chamber, where the workpiece is treated in a lower section and then moved to an upper section. (Office Action, page 3, 3rd paragraph).

Applicants submit that independent claim 26, as amended recites among other distinctive features cleaning the workpiece with a liquid in the upper section that is not shown or suggested by Kamikawa et al. Kamikawa et al. discloses as shown in Figs. 4 and 13, on both side of the upper part of the drying chamber 42, two nozzles 85, 86 are arranged so as to blow the nitrogen gas and a mixed gas of nitrogen and the IPA over the wafers W carried by the wafer guide 43 in a downward-flowing manner. ... That is the nozzles 85, 86 are constructed in a manner that gas, which has been ejected from a small number of gas outlets 87a in the inside pipe 88a, passes through a space between the circumferential face of the inside pipe 88a and that of the outside pipe

88b and subsequently flows into the drying chamber 42 through a large number of gas outlets 87b in the outside pipe 88b. ... Into the nozzles 85, 86, a mixed gas composed of the IPA and heated nitrogen gas is supplied from an IPA evaporator 89 through a control valve 90 and a filter 91. Into the IPA evaporator 89, the heated nitrogen gas is supplied to the IPA tank 94 through a control valve 95. Similarly, the nitrogen is supplied to the IPA tank 94 through control valve 96, while the IPA is also supplied to the IPA tank 94 through a control valve 97. (see col. 11, line 54 to col. 12, line 22) It is clear that Kamikawa et al. blow nitrogen gas and a mixed gas of nitrogen and IPA over the wafers. Kamikawa et al. continued reference to volatile cleaning species and the use of heaters confirm that the upper chamber is only configured to contain gas and not liquid. The combination of Kamikawa et al. with Ting et al. does not teach or suggest cleaning the workpiece with a liquid in the upper section as required by claim 26.

Moreover, Fig. 10 of Kamikawa et al. discloses that the slide door arrangement 64 comprises a rectangular flange 70 disposed between the cleaning bath 41 and the drying chamber 42, a slide door 72 inserted into an opening 71 formed in the flange 70 to open and close an interior of the flange 70, and a cylinder 73 for driving the slide door 72. (see col. 10, lines 57-62) The slide door arrangement of Kamikawa et al. does not include a provision for draining any possible liquid that can remain on the slide door when it is opened. It is not surprising since Kamikawa et al. is not concerned with cleaning the workpiece with a liquid in the upper section.

Furthermore, Kamikawa et al. include a pair of panel heater 103, 104 arranged on both side of a center of the drying chamber 42. These panel heater 103, 104 are electrically connected to a panel heater controller 105 for controlling the temperature in the chamber 42. In this way, the temperature of the chamber 42 is maintained to the extent that, for example, the IPA boils. (see col. 12, lines 43-48) The panel heaters of Kamikawa et al. ensure that the chamber temperature is sufficiently high enough to maintain the cleaning species in their gaseous state.

Accordingly, independent claim 26 recites a unique combination of depositing a conductive material on a workpiece and cleaning the workpiece in a chamber that includes lowering the workpiece into a lower section of the chamber, depositing the conductive material on the workpiece in the lower section of the chamber, raising the workpiece from the lower section to an upper section of the chamber, positioning a movable guard between the lower section and the upper section, and cleaning the workpiece with a liquid in the upper section. The unique

combination recited in independent claim 26 is neither taught nor suggested by the references alone or in combination. Claim 26 is patentable over the references.

Applicants submit that since the independent claim 26 is not taught or suggested by the references, that the dependent claims are also allowable over the references. Accordingly, applicants respectively request that the 35 USC §103(a) rejection be withdrawn and that the claims be allowed.

New claims 92-97 are patentable over the art of record. Independent claim 92 recites a method of depositing a conductive material on a surface of a semiconductor workpiece and cleaning a top surface of the conductive material in a chamber comprising the steps depositing the conductive material on the surface of the semiconductor workpiece in a lower section of the chamber, raising the workpiece to an upper section of the chamber, separating the lower section and the upper section with a movable guard, and cleaning the top surface of the workpiece with a cleaning liquid in the upper section. The unique combination of independent claim 92 is neither taught nor suggested by the references alone or in combination. The claims 93-97 recite additional features which depend from independent claim 92 and are patentable by their dependence on claim 92. It is respectfully requested that claims 92-97 be allowed.

Conclusion

Applicants have addressed the concerns of the Examiner in pointing out and distinguishing the present invention with the prior art. Claim 26 is amended to more particularly point out and distinctly claim the subject matter which the applicants regard as the invention. New claims 92-97 are added. The claims are patentable over the art of record. For these reasons, applicant respectfully requests that the Examiner reconsiders and withdraws the rejections of the claims and allows the application. Accordingly, it is respectfully requested that the claims be allowed.

If any matters can be resolved by telephone, applicant requests that the Patent and Trademark Office call the applicant at the telephone number listed below.

Respectfully submitted,

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